



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

TAKAOKA *et al.*

Appl. No.: 10/517,820

Filed: December 14, 2004

For: **Charging Equipment for
Secondary Battery**

Confirmation No.: 8798

Art Unit: 2838

Examiner: Pia Florence Tibbits

Atty. Docket: 0666.2380000/TGD/AFK

First Supplemental Information Disclosure Statement

Mail Stop Amendment

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Listed on accompanying IDS Forms are documents that may be considered material to the examination of this application, in compliance with the duty of disclosure requirements of 37 C.F.R. §§ 1.56, 1.97 and 1.98. The numbering on this First Supplemental Information Disclosure Statement is a continuation of the numbering in Applicants' Information Disclosure Statement filed on December 14, 2004 in connection with the

Applicants have listed publication dates on the attached IDS Forms based on information presently available to the undersigned. However, the listed publication dates should not be construed as an admission that the information was actually published on the date indicated.

Applicants reserve the right to establish the patentability of the claimed invention over any of the information provided herewith, and/or to prove that this information may

not be prior art, and/or to prove that this information may not be enabling for the teachings purportedly offered.

This statement should not be construed as a representation that a search has been made, or that information more material to the examination of the present patent application does not exist. The Examiner is specifically requested not to rely solely on the material submitted herewith.

Applicants have checked the appropriate boxes below.

- 1. Statement under 37 C.F.R. 1.704(d). Each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.
- 2. Filing under 37 C.F.R. § 1.97(b). This Information Disclosure Statement is being filed within three months of the date of filing of a national application other than a continued prosecution application (CPA), OR within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application, OR before the mailing date of a first Office Action on the merits OR before the mailing of a first Office Action after the filing of a request for continued examination under 37 C.F.R. § 1.114. No statement or fee is required.
- 3. Filing under 37 C.F.R. § 1.97(c). This Information Disclosure Statement is being filed more than three months after the U.S. filing date AND after the mailing date

of the first Office Action on the merits, but before the mailing date of a Final Rejection, or Notice of Allowance, or an action that otherwise closes prosecution in the application.

- a. Statement under 37 C.F.R. § 1.97(e)(1). I hereby state that each item of information contained in this Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(1).
- b. Statement under 37 C.F.R. § 1.97(e)(2). I hereby state that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application and, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(2).
- c. Attached is our PTO-2038 Credit Card Payment Form in the amount of \$180.00 in payment of the fee under 37 C.F.R. § 1.17(p).

4. Filing under 37 C.F.R. § 1.97(d) This Information Disclosure Statement is being filed more than three months after the U.S. filing date and after the mailing date of a Final Rejection or Notice of Allowance, but before payment of the Issue Fee.

Enclosed find our PTO-2038 Credit Card Payment Form in the amount of
\$ _____ in payment of the fee under 37 C.F.R. § 1.17(p); in addition:

- a. Statement under 37 C.F.R. § 1.97(e)(1). I hereby state that each item of information contained in this Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(1).
- b. Statement under 37 C.F.R. § 1.97(e)(2). I hereby state that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application and, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(2).
- 5. The document(s) was/were cited in a search report by a foreign patent office in a counterpart foreign application. Submission of an English language version of the search report that indicates the degree of relevance found by the foreign office is provided in satisfaction of the requirement for a concise explanation of relevance. 1138 OG 37, 38.
- 6. A concise explanation of the relevance of the non-English language documents FP1-FP3 appears below in accordance with 37 C.F.R. § 1.98(a)(3).

FP1 (JP 8-9563) discloses a device for charging a secondary battery, which has neither a switch means nor a voltage increment means. An English translation of the claims is provided below.

FP2 (JP 2001-228225) does not disclose a device for charging a secondary battery, but discloses a device for detecting residual capacity of a battery, which is not adapted to apply voltage onto a charged battery. Therefore, the document discloses neither a switch means nor a voltage increment means. An English translation of the claims is provided below.

FP3 (JP 3430439) discloses a secondary battery charging manner and a secondary battery charging equipment, which switches charged voltage between special charging voltage and check voltage, however, does not increment the charged check voltage. An English translation of the claims is provided below.

English Translation of Claims of FP1-FP3

(1) **FP1** (JP 8-9563)

1. A manner for charging a second battery, wherein, during charging a second battery with constant current, negative potential difference of the second battery and temperature change every unit time (temperature differentiation value) of the second battery are detected, and wherein, if the detected negative potential difference and temperature differentiation value of the second battery reaches preset or pre-selected negative potential difference and temperature differentiation value, the charging is stopped or finished.

2. A device for charging a second battery comprising:

a voltage detection circuit for detecting negative potential difference of charged voltage during charging a second battery with constant current;

a temperature detection circuit for detecting temperature change every unit time (temperature differentiation value) of the second battery during charging the second battery with the constant current;

charge control circuit which stores preset negative potential difference and preset temperature differentiation value, and compares the detected negative potential difference and the detected temperature differentiation value with the preset negative potential difference and the detected temperature differentiation value so as to control a charging switch.

(2) **FP2** (JP 2001-228225)

1. A device for detecting residual capacity of a battery comprising:

current detection means for detecting discharged and charged current about the battery;

voltage detection means for detecting terminal voltage of the battery;

voltage threshold calculation means for calculating voltage threshold relative to certain residual capacity of the battery based on current detected by the current detection means;

voltage difference calculation means for calculating voltage difference between the calculated voltage threshold and voltage detected by the voltage detection means;

voltage difference change calculation means for calculating change of the calculated voltage difference during a certain time passage;

current change calculation means for calculating change of the detected current during a certain time passage;

equilibrium voltage suggestion means for suggesting equilibrium voltage in corresponding to the detected voltage based on the calculated voltage difference change and the calculated current change;

voltage comparison means for comparing the suggested equilibrium voltage with the voltage threshold; and

residual capacity calibration means for calibrating the certain residual capacity as residual capacity of the battery depending on comparison result of the voltage comparison means.

2. The device for detecting residual capacity of a battery according to claim 1, further comprising:

temperature detection means for detecting temperature of the battery, wherein the voltage threshold calculation means calculation the voltage threshold

in correspondence to the certain residual capacity of the battery based on the detected current and temperature detected by the temperature detection means.

3. The device for detecting residual capacity of a battery according to claim 1 or 2,

wherein the detected current depends on the assumption that the discharged current value is positive, and the voltage difference is a resultant value of subtraction of the voltage threshold from the detected voltage,

wherein, if the voltage change is not less than 0 or not less than a first certain current change, and the voltage difference change is not more than 0 or not more than a first certain voltage difference change, the equilibrium voltage suggestion means suggests the equilibrium voltage to be not more than the voltage detected by the voltage detection means,

wherein, if the voltage change is not more than 0 or not more than a second certain current change, and the voltage difference change is not less than 0 or not less than a second certain voltage difference change, the equilibrium voltage suggestion means suggests the equilibrium voltage to be not less than the voltage detected by the voltage detection means, and

wherein, if the equilibrium suggestion means suggests the equilibrium voltage to be not more than the detected voltage and the voltage comparison means judges the equilibrium voltage to be not more than the voltage threshold, or if the equilibrium suggestion means suggests the equilibrium voltage to be not less than

the detected voltage and the voltage comparison means judges the equilibrium voltage to be not less than the voltage threshold, the residual capacity calibration means calibrates the certain residual capacity as the residual capacity of the battery.

(3) **FP3 (JP 3430439)**

1. A charging method for a secondary battery, comprising the steps of:

- (1) previously storing equilibrium voltage and special charging voltage corresponding to the secondary battery to be charged, the equilibrium voltage for establishing equilibrium cell potential of the secondary battery in a fully charged condition, and the special charging voltage for supplying the secondary battery with charging electric current of peak or almost peak value, wherein the special charging voltage is larger than the equilibrium voltage and does not reach a region of voltage causing irreversible chemical reaction in the secondary battery;
- (2) applying the special charging voltage to the secondary battery for a determined time;
- (3) switching charging voltage applied to the secondary battery from the special charging voltage to the equilibrium voltage;
- (4) detecting electric current flowing through the secondary battery while applying the equilibrium voltage to the secondary battery for a short time;

(5) comparing the detected electric current with standard electric current for finishing charging, and

(6) returning to the step (2) and iterating the above steps when the detected electric current is larger than standard electric current; otherwise halting charge of the secondary battery.

2. The charging method for a secondary battery according to claim 1, further comprising the following step:

short-circuiting the secondary battery between its terminals after applying the special charging voltage for the predetermined time and before switching charging voltage to the equilibrium voltage.

3. A charging equipment for a secondary battery, comprising:
charge means for charging the secondary battery;
current measurement means for measuring electric current flowing through the secondary battery;
voltage measurement means for measuring voltage applied onto the second battery or battery voltage of the second battery; and
a charge control device for controlling charge of the secondary battery, the charge control device including

storage means storing equilibrium voltage and special charging voltage corresponding to the secondary battery to be charged, the equilibrium voltage for establishing equilibrium cell potential of the secondary battery in a fully charged condition, and the special charging voltage for supplying the secondary battery with charging electric current of peak or almost peak value, wherein the special charging voltage is larger than the equilibrium voltage and does not reach a region of voltage causing irreversible chemical reaction in the secondary battery,

switching means for switching charging voltage supplied by the charge means between the equilibrium voltage and the special charging voltage, and

judging means for judging whether electric current detected by the current detection means during application of the equilibrium voltage is larger than a preset standard electric current for finishing charging or not,

wherein the charge control device controls charge of a secondary battery by first to fourth steps:

the first step of applying the special charging voltage to the secondary battery set in the charging equipment for a predetermined time;

the second step of switching charging voltage applied to the secondary battery from the special charging voltage to the equilibrium voltage;

the third step of detecting electric current flowing through the secondary battery by the current detection means while applying the equilibrium voltage to the secondary battery for a short time; and

the fourth step of returning to the first step and repeating the above steps if the judging means judges that the detected electric current is larger than the standard electric current for finishing charging; otherwise, halting the secondary battery,

4. The charging equipment for a secondary battery according to claim 1,

wherein the storage means of the charge control device previously stores the equilibrium voltages and the special charging voltages for charging various kinds of secondary batteries,

wherein data of a kind of secondary battery to be charged is inputted to the charge control device so that the equilibrium voltage and the special charging voltage in correspondence to the kind of secondary battery are selected from a table of the storage means, and

wherein, when the charge means has the second battery set thereon and is switched on, the charge means applies the special voltage onto the second battery.

- 7. Copies of documents FP1-FP3 and NPL1-NPL2 were submitted in the IDS filed December 14, 2004.
- 8. Copies of the documents were cited by or submitted to the Office in an IDS that complies with 37 C.F.R. § 1.98(a)-(c) in Application No.10/517,820, filed December 14, 2004, which is relied upon for an earlier filing date under 35

U.S.C. § 120. Thus, copies of these documents are not attached. 37 C.F.R. § 1.98(d).

9. It is expected that the examiner will review the prosecution and cited art in the parent application no(s). _____ in accordance with MPEP 2001.06(b), and indicate in the next communication from the office that the art cited in the earlier prosecution history has been reviewed in connection with the present application.

It is respectfully requested that the Examiner initial and return a copy of the enclosed IDS Forms, and indicate in the official file wrapper of this patent application that the documents have been considered.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036.

Respectfully submitted,

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Date: October 3, 2005

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Substitute for form 1449/PTO				<i>Complete if Known</i>	
FIRST SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Application Number	10/517,820
Sheet	1	of	1	Filing Date	December 14, 2004
				First Named Inventor	Hiromi TAKAOKA
				Art Unit	2838
				Examiner Name	Pia Florence Tibbits
				Attorney Docket Number	0666.2380000/TGD/AFK

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (If Known)			
US1					
US2					
US3					
US4					
US5					
US6					
US7					
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FOREIGN PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Country Code ³ Number ⁴ Kind Code ⁵ (if known)			
	FP1	8-9563	01/12/1996		
	FP2	2001-228225	08/24/2001		
	FP3	3430439	05/23/2003		
	FP4				
	FP5				
	FP6				
	FP7				
	FP8				
	FP9				

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Examiner Signature	Date Considered
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This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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FIRST SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Application Number	10/517,820	
				Filing Date	December 14, 2004	
				First Named Inventor	Hiromi TAKAOKA	
				Art Unit	2838	
				Examiner Name	Pia Florence Tibbits	
Sheet		1	of	1	Attorney Docket Number	0666.2380000/TGD/AFK

NON PATENT LITERATURE DOCUMENTS						
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume issue number(s), publisher, city and/or country where published				T ²
	NPL1	International Search Report for International Application No. PCT/JP2004/008046, Japanese Patent Office, mailed on October 5, 2004.				
	NPL2	Dialog File 351, Accession No. 14146984, Derwent WP1 English language abstract for JP 2001-228225.				
	NPL3					
	NPL4					
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	NPL7					
	NPL8					
	NPL9					
	NPL10					

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¹ Applicant's unique citation designation number (optional). ² Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.